REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 1 and 5 are pending. Claims 1 and 5 are independent claims.

Objection to the Title

The title has been amended to recite a fluorene polymer. Applicant believes this should meet the descriptive requirements.

Rejection(s) under 35 U.S.C. §103(a)

Claims 1 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Miteva et al. (Adv. Mater. 2001, 13, 555-570) (hereafter "Miteva") in view of Aurelie et al. (WO 03/048225), where Treacher et al. (US 2004/0260090) (hereafter "Treacher") is used as the English equivalent, Son et al. (US 2003/0094595) (hereafter "Son") and applicant's admitted prior art (hereafter "AAPA"). This rejection is respectfully traversed.

The present invention relates to light emitting polymers comprising 9,9-dihexylethylfluorene polymers that are end-capped with di-(p-tolyl)-4-bromophenylamine. The inventors found that it is necessary to select materials and processes that restrict the quantity of chlorine contents in the final products. (¶ [0011]). That is, the chlorine content is a critical factor. Once the chlorine content is controlled to a certain level (e.g., 50 ppm or less), it is also important to control the total metal contents in the final polymers. Specifically, the inventors

found that when the chlorine content (Cl) and the sum total (ΣM) of metal elements (including at least one of sodium, nickel and palladium) satisfy a relation of: ΣM < Cl and the chlorine content is 50 ppm or less, the maximum current efficiencies of these polymers are significantly improved and the luminance damping times are greatly extended. (Table 3). These unique limitations are not taught or suggested in any of the prior art references.

Miteva discloses end-capped fluorene polymers. As acknowledged by the Examiner (Office Action, p. 5, ¶ 11), Mideva does not teach the purification of the fluorene polymers.

Treacher discloses processes for producing aryl-aryl coupled compounds, which may be used to prepare polymer-based LED elements. These monomers are shown in ¶ [0107]. The synthesis of these compounds involves Suzuki reaction, which employs palladium catalysts. (¶ [0068]). A preferred polymerization process is described in ¶¶ [0080] – [0093]. Treacher teaches a general need to purify the polymer products:

> At the end of the reaction, the polymer may be further purified by customary purification procedures such as, for example, precipitation, reprecipitation, extraction and the like. Fo use in high-quality applications (for example, polymeric light-emitting diodes), contamination with organic (for example, oligomeric) and inorganic substances (for example, Pd residues, base residues) usually has to be brought to as low a level as possible. (¶ [0090]).

However, Treacher does not disclose that the polymers may contain chlorine or chloride. Therefore, Treacher says absolutely nothing about metal contents being less than the content of chlorine and the content of chlorine being 50 ppm or less in the polymers.

Son discloses a blue electroluminescent polymer comprising biphenyl units in a

main chain of polyarylene. (Abstract). Son also teaches a general need to purify the polymers:

> In order to overcome these problems, a polymerization process capable of minimizing defects in polymer, and a purification process capable of removing impurities present in polymer, are needed. (¶ [0009]).

However, Son does not teach any particular impurities. That is, Son also does not teach or suggest that metal contents are less than the content of chlorine and the content of chlorine is 50 ppm or less in the polymers.

AAPA states that polymers for the EL element are disclosed in PCT application No. 2001-527102 and Japanese Patent Application Laid-Open No. 2002-212977. (¶ [0005][1]). AAPA (¶¶ [0006] – [0007]) further teaches that:

> "In such polymers for the EL element, impurities composed of, for instance, an inorganic element, specifically, a metal element such as sodium, nickel, palladium, or impurities such as chlorine may be mixed in a process for synthesizing a polymer.
>
> Then, when the impurities such as the metal element are mixed in the polymer for the EL element used in the light emitting layer of the organic EL element, the impurities may possibly cause inconveniences that the impurities become, for instance, conditions of metal ions in the light emitting layer to serve to quench the light and lower a light emitting efficiency, or react with the polymer to deteriorate the polymer itself, shorten the life of the organic EL element, and further change a light emitting color."

These paragraphs do not teach the relationship between the total metal contents and the content of chlorine. The prior art references cited in AAPA only disclose light emitting layers having metal impurities of 100 ppm or less and methods for removing metal impurities. None of the prior art references teach that the content of chlorine should be 50 ppm or less, let alone the relationship between the total metal contents and the chlorine content.

[1] Paragraph numberings are based on those in the published application No. 2007/0208162.

The Examiner does not cite anything specific that teaches these limitations. Instead, the Examiner asserts that because these impurities are known to be bad and it would be obvious for one skilled in the art to want to minimize these impurities. The Examiner cites *ex parte Gray*, 10 USPQ2d 1922 (BPAI 1989) ("the mere purity of a product, by itself, does not render the product unobvious") as support for the obviousness rejection. However, *ex parte Gray* is in the context of purifying an old product. M.P.E.P. § 2144.04 (VII). Applicant agrees that purer products without unexpected results would not be patentable.

However, the present claims do not deal with simple purities. Instead, the claims require a specific limit of the chlorine content (i.e., 50 ppm or less) and a specific relationship between the total metal contents and the chlorine content ($\Sigma M < Cl$).

The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). See also *KSR*, 5 82 USPQ2d at 1396 (quoting Federal Circuit statement with approval), and M.P.E.P. § 2142.

None of the prior art references teach or suggest the criticality of the chlorine content and the relationship between the total metal contents and the chlorine content, and the Examiner also does not articulate reasoning with some rational underpinning as to why these particular limitations would be obvious. If the Examiner bases this rejection on personal knowledge, Applicant respectfully requests that the Examiner provide an affidavit as required by 37 C.F.R. 1.104(d)(2).

For reasons set forth above, none of the cited prior art references teach or suggest the relationship between the impurity metals and chloride and the specific level of the chloride (i.e., $\Sigma M < Cl$ and the chlorine content is 50 ppm or less), as required by claims 1 and 5. Therefore, claims 1 and 5 are patentable over Miteva, in view of Treacher, Son and AAPA. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 17155/005001).

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Respectfully submitted,

By _____

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